

Appl. N . 10/669,499
Amdt. dated February 5, 2004
Preliminary Amendment

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1.-38. (canceled)

Claim 39. (new) A method for analyzing mass spectra, the method comprising:

- (a) detecting signals including signal intensities in a plurality of spectra, wherein each spectrum in the plurality of spectra comprises data representing signal strength as a function of time-of-flight, mass-to-charge ratio, or a value derived from time-of-flight or mass-to-charge ratio;
- (b) forming at least one signal cluster by clustering signals with similar time-of-flights, mass-to-charge ratios, or values derived from time-of-flights or mass-to-charge ratios;
- (c) selecting one or more signal clusters from the plurality of signal clusters if the number of signals in a signal cluster exceeds a predetermined number of signals; and
- (d) selecting the time-of-flights, the mass-to-charge ratios, or the values derived from the time-of-flights or the mass-to-charge ratios of the selected one or more signal clusters in (c).

Claim 40. (new) The method of claim 39 wherein the plurality of mass spectra is a first plurality of mass spectra and wherein the method further comprises:

- (e) forming a second plurality of mass spectra, wherein the second plurality of mass spectra is formed using the time-of-flights, the mass-to-charge ratios, or the values derived from the time-of-flights or mass-to-charge ratios selected in (d).

Claim 41. (new) The method of claim 40 further comprising normalizing signal intensity values in the second plurality of mass spectra.

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Claim 42. (new) The method of claim 40

wherein the plurality of mass spectra is from a plurality of samples, and wherein each sample is, or is to be assigned to a class within a class set comprising two or more classes, each class being characterized by a different biological status.

Claim 43. (new) The method of claim 42 further comprising after (e):

forming a classification model which discriminates between the classes in the class set.

Claim 44. (new) The method of claim 43 wherein the classification model is formed by analyzing a data set obtained from the second plurality of mass spectra, wherein analyzing includes executing code embodying a classification process.

Claim 45. (new) The method of claim 44 wherein the classification process is a recursive partitioning process.

Claim 46. (new) The method of claim 44 wherein the classification process is a neural network process.

Claim 47. (new) The method of claim 39 further comprising modifying the second plurality of mass spectra by adding estimates for missing signals.

Claim 48. (new) A method of classifying an unknown sample into a class characterized by a biological status using a digital computer, the method comprising:

- (a) entering mass spectrum data of the unknown sample into a digital computer; and
- (b) processing the mass spectrum data using the classification model formed by the method of claim 43 to classify the unknown sample in a class characterized by a biological status.

Claim 49. (new) The method of claim 48 wherein the class is characterized by a disease status.

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Claim 50. (new) A computer readable medium comprising:

- (a) code for detecting signals including signal intensities in a plurality of spectra, wherein each spectrum in the plurality of spectra comprises data representing signal strength as a function of time-of-flight, mass-to-charge ratio, or a value derived from time-of-flight or mass-to-charge ratio;
- (b) code for forming at least one signal cluster by clustering signals with similar time-of-flights, mass-to-charge ratios, or values derived from time-of-flights or mass-to-charge ratios;
- (c) code for selecting one or more signal clusters from the plurality of signal clusters if the number of signals in a signal cluster exceeds a predetermined number of signals; and
- (d) code for selecting the time-of-flights, the mass-to-charge ratios, or the values derived from the time-of-flights or the mass-to-charge ratios of the selected one or more signal clusters.

Claim 51. (new) The computer readable medium of claim 50 wherein the plurality of mass spectra is a first plurality of mass spectra and wherein the method further comprises:

- (e) code for forming a second plurality of mass spectra, wherein the second plurality of mass spectra is formed using the time-of-flights, the mass-to-charge ratios, or the values derived from the time-of-flights or mass-to-charge ratios obtained from the selected signal clusters.

Claim 52. (new) The computer readable medium of claim 50 further comprising code for normalizing signal intensity values in the second plurality of mass spectra.

Claim 53. (new) The computer readable medium of claim 50

wherein the plurality of mass spectra are from a plurality of samples, wherein each sample is, or is to be assigned to a class within a class set comprising two or more classes, each class characterized by a different biological status.

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Claim 54. (new) The computer readable medium of claim 53 further comprising:
code for forming a classification model which discriminates between the classes in the class set.

Claim 55. (new) The computer readable medium of claim 54 wherein the classification model is formed by analyzing a data set obtained from the second plurality of mass spectra, wherein analyzing includes executing code embodying a classification process.

Claim 56. (new) The computer readable medium of claim 55 wherein the classification process is a recursive partitioning process.

Claim 57. (new) The computer readable medium of claim 55 wherein the classification process is a neural network process.

Claim 58. (new) The computer readable medium of claim 50 further comprising code for modifying the second plurality of mass spectra by adding estimates for missing signals.

Claim 59. (new) A system comprising:
a gas phase ion spectrometer;
a digital computer adapted to process data from the gas phase ion spectrometer; and
the computer readable medium of claim 50 in operative association with the digital computer.

Claim 60. (new) A computer readable medium for classifying an unknown sample into a class characterized by a biological status using a digital computer, the computer readable medium comprising:

(a) code for entering data from a mass spectrum of the unknown sample into a digital computer; and

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(b) code for processing the mass spectrum data using a classification model to classify an unknown sample in a class characterized by a biological status, wherein the classification model is formed by a process including

(i) detecting signals including signal intensities in a plurality of spectra, wherein each spectrum in the plurality of spectra comprises data representing signal strength as a function of time-of-flight, mass-to-charge ratio, or a value derived from time-of-flight or mass-to-charge ratio,

(ii) forming a plurality of signal clusters by clustering signals with similar time-of-flights, mass-to-charge ratios, or values derived from time-of-flights or mass-to-charge ratios,

(iii) selecting one or more signal clusters from the plurality of signal clusters, if the number of signals in a signal cluster exceeds a predetermined number of signals,

(iv) selecting the time-of-flights, the mass-to-charge ratios, or the values derived from the time-of-flights or the mass-to-charge ratios of the selected one or more signal clusters in (iii), and

(v) forming a second plurality of mass spectra, wherein the second plurality of mass spectra is formed using the time-of-flights, the mass-to-charge ratios, or the values derived from the time-of-flights or the mass-to-charge ratios selected in (iv).

Claim 61. (new) The computer readable medium of claim 60 wherein the class is characterized by a disease status.

Claim 62. (new) A system comprising:

a gas phase ion spectrometer;

a digital computer adapted to process data from the gas phase ion spectrometer; and

the computer readable medium of claim 60 in operative association with the digital computer.